

Saline Water Management for Irrigation

(3rd Revised Draft)

**Work Team on Use of
Poor Quality Water for Irrigation (WT-PQW)**



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agreement in the world as to the relative tolerance of many crops (Framji 1976). High temperature decreases the salt tolerance of crops; some of them are alfalfa, bean, beet, carrot, cotton, onion and tomatoes. Higher atmospheric humidity tends to increase somewhat the tolerance of crops as reported in USA, India, Near East and other countries. Rainfall, though does not have a direct effect on crop tolerance, may indirectly affect by leaching the response of plants to irrigation with saline water.

5.4.3 Crop Growth Stages and Varietal Differences

Plants are more sensitive during the early growth period than at later stages (germination, emergence, seedling). The salt tolerance increases as the plant advances towards maturity. The saline waters considered unacceptable in early stages of plant growth could be used profitably during later stages of growth without any reduction in crop growth (CSSRI, 2000). Rice is sensitive at seedling and flowering stages. Sugarbeet is tolerant at later growth stages but is sensitive during germination stage. Corn is tolerant at germination but is more sensitive at seedling, growth, ear and grain yield stages.

All India coordinated Research Project (AICRP) under Indian Council of Agriculture Research (ICAR) found in saline water conditions at Bapatla 24% yield reduction in rice two days after transplanting followed by at filling stage 17%, in onion yield reduction 78% with saline water irrigation at transplanting stage followed by 56% at bud formation stage and 18% at bulb development stage, in clusterbean 12% yield reduction at pod development stage; at Dharwad in maize about 13% yield reduction at sowing stage followed by 7% at tasseling stage and at Agra in safflower yield reduction was found at 21% at germination stage followed by 7% at rosette stage.

Varietal difference among crops may cause strong differences regarding salt tolerance among varieties and root stocks of fruit trees and vine crops. Tolerant plants require multiple adaptations to enable them to grow in saline environments. The problem faced by plant scientist wishing to enhance tolerance in crop plants is how to manipulate complex multigenic traits. The research work needs to be aimed at basic information about the genetic of physiological traits and attempts to discover genes regulating salt tolerance following the imposition of salinity stress and understanding signaling cascades.

Modern molecular techniques can be used to analyze the genetics of quantitative traits determined by quantitative traits loci (QTLs) developing practical markers and map their positions for positional cloning to discover genes. The use of DNA-based technology is capable of dealing with large number of samples, markers may be a valuable means of assisting in the development of salt tolerance in plants. The molecular biological approaches may be helpful to enhancing salt tolerance (CSSRI 1993).

5.4.4 Crop Selection

Crop selection is an important management decision. The most desirable characteristics in selecting crop for irrigation with saline water are: (1) high marketability (2) high economics value, (3) ease of management (4) tolerance to salts and specific ions, (5) ability to maintain quality under saline conditions, (6) low potential to accumulate trace elements, and (7) compatibility in crop rotation (Grattan and Rhoades 1990 – Tanji 1994). Other factors in crop or their evaporative demands are lower at planting stage.

5.4.5 Cultural Practices

Many factors that facilitate the use of saline water are related to management practices for short and long term salinity control. Adequate drainage and leaching to control salinity within the tolerances of the crops (or change to more salt tolerant crop that require less leaching for adequate salt control) are the ones most appropriate management practices for long term salinity control but there are separate cultural practices that can have a profound effect upon germination, early seedling growth and ultimately on yield of crop. The short term cultural practices that facilitates salinity control become more important as the irrigation water salinity increase over the time. These practices are adopted on annual or continual basis.